Complete Summary

GUIDELINE TITLE

Hypertension diagnosis and treatment.

BIBLIOGRAPHIC SOURCE(S)

Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2005 Oct. 53 p. [97 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2004 Feb. 47 p.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
CONTRAINDICATIONS
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INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Hypertension

GUIDELINE CATEGORY

Diagnosis
Evaluation
Risk Assessment
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Geriatrics
Internal Medicine
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Care Providers
Health Plans
Hospitals
Managed Care Organizations
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To increase the percentage of patients in blood pressure control
- To improve the assessment of patients with hypertension
- To increase the percentage of patients not at blood pressure goal who have a change in subsequent therapy
- To increase the percentage of patients with hypertension who receive patient education, especially in the use of non-pharmacological treatments

TARGET POPULATION

Adults age 18 or older

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Evaluation

1. History and physical examination, including 2 or more blood pressure measurements separated by 2 minutes in accordance with recommended techniques
2. Laboratory screen, including 12-lead electrocardiogram (ECG), urinalysis, blood glucose, hematocrit, serum sodium, potassium, creatinine (or glomerular filtration rate), calcium, and lipid profile (total cholesterol, high-density lipoprotein [HDL] cholesterol, low-density lipoprotein [LDL] cholesterol, and triglycerides)

Risk Assessment/Treatment/Follow-Up

1. Risk assessment and treatment based on blood pressure level, presence or absence of target organ damage, and other risk factors, such as smoking, dyslipidemia, diabetes, and others

2. Evaluation for secondary hypertension
3. Lifestyle modifications, including weight reduction and maintenance, the DASH diet, reduction of dietary sodium, moderation of alcohol intake, physical activity, tobacco avoidance, relaxation and stress management
4. Drug therapy, including thiazide diuretics, beta-blockers, angiotensin-converting enzyme inhibitors, calcium channel blockers, angiotensin receptor blockers, and combinations of these drugs
5. Patient education
6. Referral for consultation for resistant hypertension
7. Follow-up and continuing care

MAJOR OUTCOMES CONSIDERED

- Risk of non-fatal and fatal cardiovascular disease in individuals with hypertension
- Morbidity and mortality from cardiovascular disease in individuals with hypertension
- Adequate control of blood pressure (<140 mm Hg systolic and <90 mm Hg diastolic)

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Key conclusions (as determined by the work group) are supported by a conclusion grading worksheet that summarizes the important studies pertaining to the conclusion. Individual studies are classed according to the system presented below, and are designated as positive, negative, or neutral to reflect the study quality.

Conclusion Grades:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results of different studies or because of serious doubts about generalizability, bias, researvh design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

Grade Not Assignable: There is no evidence available that directly supports or refutes the conclusion.

Study Quality Designations:

The quality of the primary research reports and systematic reviews are designated in the following ways on the conclusion grading worksheets:

Positive: indicates that the report or review has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis.

Negative: indicates that these issues (inclusion/exclusion, bias, generalizability, and data collection and analysis) have not been adequately addressed.

Neutral: indicates that the report or review is neither exceptionally strong nor exceptionally weak.

Not Applicable: indicates that the report is not a primary reference or a systematic review and therefore the quality has not been assessed.

Classes of Research Reports:

A. Primary Reports of New Data Collection:

Class A:

- Randomized, controlled trial

Class B:

- Cohort study

Class C:

- Non-randomized trial with concurrent or historical controls
- Case-control study
- Study of sensitivity and specificity of a diagnostic test
- Population-based descriptive study

Class D:

- Cross-sectional study
- Case series
- Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M:

- Meta-analysis
- Systematic review
- Decision analysis
- Cost-effectiveness analysis

Class R:

- Consensus statement
- Consensus report
- Narrative review

Class X:

- Medical opinion

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Clinical Validation-Pilot Testing
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Institute Partners: System-Wide Review

The guideline draft, discussion, and measurement specification documents undergo thorough review. Written comments are solicited from clinical, measurement, and management experts from within the member medical groups during an eight-week period of "Critical Review."

Each of the Institute's participating medical groups determines its own process for distributing the guideline and obtaining feedback. Clinicians are asked to suggest modifications based on their understanding of the clinical literature coupled with their clinical expertise. Representatives from all departments involved in implementation and measurement review the guideline to determine its operational impact. Measurement specifications for selected measures are developed by the Institute for Clinical Systems Improvement (ICSI) in collaboration with participating medical groups following general implementation of the guideline. The specifications suggest approaches to operationalizing the measure.

Guideline Work Group: Second Draft

Following the completion of the "Critical Review" period, the guideline work group meets 1-2 times to review the input received. The original guideline is revised as necessary and a written response is prepared to address each of the suggestions received from medical groups. Two members of the Cardiovascular Steering Committee carefully review the Critical Review input, the work group responses, and the revised draft of the guideline. They report to the entire committee their assessment of two questions: (1) Have the concerns of the medical groups been adequately addressed? (2) Are the medical groups willing and able to implement the guideline? The committee then either approves the guideline for pilot testing as submitted or negotiates changes with the work group representative present at the meeting.

Pilot Test

Medical groups introduce the guideline at pilot sites, providing training to the clinical staff and incorporating it into the organization's scheduling, computer, and other practice systems. Evaluation and assessment occur throughout the pilot test

phase, which usually lasts for three months. Comments and suggestions are solicited in the same manner as used during the "Critical Review" phase.

The guideline work group meets to review the pilot sites' experiences and makes the necessary revisions to the guideline, and the Cardiovascular Steering Committee reviews the revised guideline and approves it for implementation.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Note from the National Guideline Clearinghouse (NGC) and the Institute for Clinical Systems Improvement (ICSI): In addition to updating their clinical guidance, ICSI has developed a new format for all guidelines. Key additions and changes include: combination of the annotation and discussion section; the addition of "Key Points" at the beginning of most annotations; the inclusion of references supporting the recommendations; and a complete list of references in the Supporting Evidence section of the guideline. For a description of what has changed since the previous version of this guidance, refer to "Summary of Changes - October 2005."

The recommendations for the diagnosis and treatment of hypertension are presented in the form of an algorithm with 12 components, accompanied by detailed annotations. An algorithm is provided for Hypertension Diagnosis and Treatment. Clinical highlights and selected annotations (numbered to correspond with the algorithm) follow.

Class of evidence (A-D, M, R, X) ratings and key conclusion grades (I-III, Not Assignable) are defined at the end of the "Major Recommendations" field.

Clinical Highlights

1. Confirmation of hypertension is based on the initial visit, plus two follow-up visits with at least two blood pressure measures at each visit. (Annotation #2)
2. Standardized blood pressure measurement techniques (including out of office or home blood pressure measurements) should be employed when confirming an initially elevated blood pressure (BP) and for all subsequent measures during follow-up and treatment for hypertension. (Annotation #2, Annotation Appendix B - see original guideline document)
3. A thiazide-type diuretic should be considered as initial therapy in most patients with uncomplicated hypertension. (Annotation #6)
4. Physician reluctance to intensify treatment is a major obstacle to achieving treatment goals. (Annotation #6)
5. Systolic blood pressure level should be the major factor for the detection, evaluation, and treatment of hypertension, especially in adults 50 years and older. (Annotation #7)
6. For many patients, two or more drugs in combination may be needed to reach hypertension goals. (Annotation #8)

Hypertension Diagnosis and Treatment Algorithm Annotations

2. Confirm Elevated Blood Pressure

Key Points:

- All elevated blood pressure readings should be confirmed.
- A standardized blood pressure measurement process is important for correctly identifying hypertensive patients.

If an elevated blood pressure reading has been obtained (as the result of routine blood pressure screening - (see the National Guideline Clearinghouse [NGC] summary of the Institute for Clinical Systems Improvement [ICSI] guideline Preventive Services for Adults), the blood pressure level should be confirmed. Confirmation is based on the initial visit plus two follow-up visits with at least 2 blood pressure readings at each visit. Explain the rationale; emphasize the reason for return and the need for confirmation of elevated blood pressure. Unconfirmed hypertension should be coded as indicated in the original guideline document. Confirmation and follow-up recommendations are noted in Tables 1 and 2 in the original guideline document.

Standardized Blood Pressure Measurement

Accurate, reproducible blood pressure measurement is important to allow comparisons between blood pressure values and to correctly classify blood pressure. Incorrectly labeling a hypertensive patient normotensive may increase risk for vascular events, since risk rises with increasing blood pressure. Labeling a patient with normal blood pressure as a hypertensive can affect insurability, employment, morbidity from medications, loss of time from work, and unnecessary lab and physician visits.

Standardized blood pressure technique should be employed when confirming an elevated reading and for all subsequent readings during follow-up and treatment for hypertension. See Annotation Appendix B, "Standards for Blood Pressure Measurement," in the original guideline document.

Confirmed elevated blood pressure should be classified as to the appropriate hypertension stage.

Ambulatory blood pressure monitoring (ABPM) provides information about BP during daily activities and sleep. It is particularly helpful in the assessment of white coat or office effect, i.e., patients with elevated office BP who lack evidence of hypertensive target organ damage and who have normal out-of-office BP readings. This phenomenon may be present in 20 to 35% of patients diagnosed with hypertension. In general, however, this diagnosis can be reliably established without ABPM in patients with elevated office readings who lack target organ damage and have accurately measured out-of-office BP readings that are consistently less than 135/85 mm Hg. Other clinical situations in which ABPM may be helpful include the assessment of drug resistance, hypotensive symptoms, episodic hypertension, and suspected autonomic dysfunction. ABPM also appears to predict subsequent cardiovascular events more reliably than office blood pressure measurements.

Out-of-office or home blood pressure measurements also provide important information regarding the diagnosis and treatment of hypertension and are less expensive than ABPM. Home blood pressure readings are a stronger predictor of subsequent cardiovascular events than are office readings. In addition, the use of home blood pressure measurements might reveal the patient with "masked hypertension" i.e., normal office and elevated home readings. Fully automated devices using an appropriately sized upper arm cuff are preferred over aneroid devices or those automated devices that measure blood pressure at the wrist or on the finger. Accuracy of the patient's automated device should be confirmed periodically (e.g., annually) by the patient's health care professional.

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) reflects the creation of a new classification, termed as "prehypertension," which is intended to identify individuals in whom early intervention of healthy lifestyle changes could reduce BP, decrease the rate of the progression of BP to hypertensive levels with age, or prevent hypertension entirely.

JNC 7 has also combined stage 2 and stage 3 hypertension into a single stage 2 category. This change was made primarily because the management of the two former groups is similar.

Blood Pressure Screening Clarification

Because all stages of hypertension are associated with increased vascular events, the previous classifications of mild and moderate hypertension were discarded in favor of stages that emphasize these risks. The current classification emphasizes systolic as well as diastolic standards, as systolic hypertension has been associated with increased fatal and nonfatal cardiovascular events, and treatment has been shown to reduce cardiovascular morbidity and mortality.

A proposed follow-up schedule based on the initial blood pressure level as well as prior diagnosis and treatment of cardiovascular disease and risk factors is noted in JNC VI Table 3.

Refer to the original guideline document for the International Classification of Diseases, Ninth Revision (ICD-9) code to be used for the initial encounter ("Elevated blood pressure reading without diagnosis of hypertension. Note: this category is to be used to record an episode of elevated blood pressure in a patient in whom no formal diagnosis of hypertension has been made, or as an incidental finding.")

This guideline encourages increased use of this ICD-9 code as it is currently believed to be underreported.

Evidence supporting this recommendation is of classes: A, B, C, D, R

3. Complete Initial Assessment: Evaluate, Accurately Stage, and Complete Risk Assessment

Key Points:

- It is important to assess and accurately stage newly confirmed hypertension.
- A complete review of all medications (prescription and over-the-counter) and herbal supplements is very important.

The goal of the clinical evaluation in newly confirmed hypertension is to determine whether the patient has primary or secondary hypertension, target organ disease, and other cardiovascular risk factors. (Risk assessment)

A. Accurately Stage

This treatment guideline is designed to be used in new or previously diagnosed hypertensive patients in conjunction with the NGC summary of the ICSI Preventive Services for Adults guideline. See Annotation Appendix B, "Standards for Blood Pressure Measurement," in the original guideline document.

Hypertension Stages	Systolic		Diastolic
Prehypertension	120-139	or	80-89
Stage 1 hypertension	140-159	or	90-99
Stage 2 hypertension	≥160	or	≥100

When systolic and diastolic pressures fall into different categories, the higher category should be selected in classifying the individual's blood pressure status.

B. Risk Assessment

The risk for cardiovascular disease in patients with hypertension is determined not only by the level of blood pressure but also by the presence or absence of target organ damage or other risk factors such as smoking, dyslipidemia, and diabetes, as shown in JNC 7. These factors independently modify the risk for subsequent cardiovascular disease, and their presence or absence is determined during the routine evaluation of patients with hypertension (i.e., history, physical examination, laboratory tests).

C. Medical History

The history should focus on modifiable lifestyle factors including weight change, dietary intake of sodium and cholesterol, level of exercise, psychosocial stressors, and patterns of alcohol and tobacco use.

Determine all medications being used--including herbal supplements, over-the-counter, prescription, and illicit drugs--as many agents may temporarily elevate blood pressure and/or adversely affect blood

pressure control. See Annotation Appendix E, "Recommended Education Messages" in the original guideline document.

A family history of hypertension, cardiovascular disease, cerebrovascular disease, diabetes mellitus, and dyslipidemia should be documented.

Assess for symptoms and signs of target organ disease and secondary hypertension via a directed history.

D. Physical Examination

The initial physical examination should include the following:

- 2 or more blood pressure measurements separated by 2 minutes with the patient seated and after standing for at least 2 minutes in accordance with the recommended techniques as stated in Annotation Appendix B, "Standards for Blood Pressure Measurement" in the original guideline document
- Verification in the contralateral arm (if values are different, the higher value should be used)
- Measurement of height, weight, and waist circumference
- Funduscopic examination for hypertensive retinopathy (i.e., arteriolar narrowing, focal arteriolar constrictions, arteriovenous crossing changes, hemorrhages and exudates, disc edema)
- Examination of the neck for carotid bruits, distended veins, or an enlarged thyroid gland
- Examination of the heart for abnormalities in rate and rhythm, increased size, precordial heave, clicks, murmurs, and third and fourth heart sounds
- Examination of the lungs for rales and evidence for bronchospasm
- Examination of the abdomen for bruits, enlarged kidneys, masses, and abnormal aortic pulsation
- Examination of the extremities for diminished or absent peripheral arterial pulsations, bruits, and edema
- Neurological assessment

E. Initial Laboratory Studies

Initial lab screen should include 12-lead electrocardiogram (ECG), urinalysis, fasting blood glucose, hematocrit, serum sodium, potassium, creatinine (or estimated or measured glomerular filtration rate [GFR]), calcium, and lipid profile (total cholesterol, high density lipoprotein [HDL]-cholesterol, low density lipoprotein [LDL]-cholesterol and triglycerides). Additional laboratory and diagnostic studies may be required in individuals with suspected secondary hypertension and/or evidence of target-organ disease.

Some of these tests are needed for determining presence of target organ disease and possible causes of hypertension. Others relate to cardiovascular risk factors or provide baseline values for judging biochemical effects of therapy.

Additional tests may be ordered at the discretion of the provider based on clinical findings. These may include but are not limited to complete blood count (CBC), chest x-ray, uric acid, and urine microalbumin.

See Annotation Appendix A, "Clinical Evaluation of Confirmed Hypertension" in the original guideline document.

JNC 7 Cardiovascular Risk Factors/Target Organ Damage

Major Risk Factors

- Hypertension
- Age (older than 55 for men, 65 for women)*
- Diabetes mellitus**
- Elevated LDL cholesterol
- Low HDL cholesterol**
- Estimated glomerular filtration rate (GFR) less than 60 mL/min
- Microalbuminuria
- Family history of premature cardiovascular disease (men younger than 55 or women younger than 65)
- Obesity** (body mass index greater than or equal to 30 kg/m^2), waist circumference greater than 40 inches for men and greater than 35 inches in women)
- Physical inactivity
- Tobacco usage, particularly cigarettes

Target Organ Damage

- Heart
    - Left ventricular hypertrophy
    - Angina/prior myocardial infarction
    - Prior coronary revascularization
    - Heart failure
- Brain
    - Stroke or transient ischemic attack
    - Dementia
- Chronic kidney disease
- Peripheral arterial disease
- Retinopathy

* Increased risk begins at approximately 55 and 65 for men and women, respectively. Adult Treatment Panel III used earlier age cutpoints to suggest the need for earlier action.

** Components of the metabolic syndrome. Reduced HDL and elevated triglycerides are components of the metabolic syndrome. Abdominal obesity is also a component of metabolic syndrome.

A point scale approach for estimating 10 year coronary heart disease risk can also be used. Refer to Annotation Appendix D, "10 year CVD Risk Calculator (Risk Assessment)" in the original guideline document.

Evidence supporting this recommendation is of classes: B, R

4. Is Secondary Cause Suspected?

The term "secondary hypertension" implies that a patient's blood pressure elevation is the result of an underlying discoverable disease process. Secondary causes account for only a small percentage of all documented cases of hypertension, but their detection is important as appropriate intervention may be curative and lead to reversal of hypertension.

Evaluate for features suggestive of secondary hypertension. Suspect a diagnosis of secondary hypertension in patients with an abrupt onset of symptomatic hypertension, with Stage 2 hypertension, hypertensive crisis, sudden loss of blood pressure control after many years of stability on drug therapy, drug resistant hypertension, and in those individuals with no family history of hypertension. Differential diagnosis of secondary hypertension includes:

- Chronic kidney disease/obstructive uropathy
- Thyroid and parathyroid disease
- Drugs (prescription, over-the-counter, herbal supplement, illicit drugs)
- Excessive alcohol use
- Obstructive sleep apnea
- Primary aldosteronism
- Renal artery stenosis
- Pheochromocytoma
- Cushing's syndrome
- Aortic coarctation
- Obesity

See Annotation Appendix C, "Suspicion of Secondary Hypertension," in the original guideline document.

Note recommendations for additional diagnostic procedures. Be sure advanced testing is correctly chosen and done properly to avert the need for repeat studies. This may require discussion with or referral to a specialist.

5. Order Additional Work-Up/Consider Referral

Consider appropriate referral or additional workup if secondary hypertension is identified, or suspected.

If you suspect a diagnosis of secondary hypertension, it is recommended that you perform a phone consultation and/or refer the patient to a specialist early in order to confirm the most efficient and cost-effective approach to patient evaluation and management.

Evidence supporting this recommendation is of class: R

6. Lifestyle Modifications +/- Drug Therapy

Key Points:

- Lifestyle modifications should be the cornerstone of the initial therapy for hypertension.

Clinical studies show that the blood pressure lowering effects of lifestyle modifications can be equivalent to drug monotherapy. Lifestyle modification is best initiated and sustained through an educational partnership between the patient and a multidisciplinary health care team. While team members may vary by clinical setting, behavior change strategies should include nutrition, exercise, and smoking cessation services. Lifestyle modifications should be reviewed and re-emphasized at least annually.

Some patient education should occur and be documented at every visit. For recommended education messages, see Annotation Appendix E, "Recommended Education Messages," in the original guideline document.

Table 3. Lifestyle Modifications to Prevent and Manage Hypertension*

Modification	Recommendation	Approximate Systolic Blood Pressure (SBP) Reduction (Range)**
Weight reduction	Maintain normal body weight (body mass index 18.5-24.9 kg/m^2)	5-20 mm Hg/10 kg
Adopt Dietary Approaches to Stop Hypertension (DASH) eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat.	8-14 mm Hg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2-8 mm Hg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30-45 minutes per day, most days of the week)	4-9 mm Hg
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (e.g., 24 oz. beer, 10 oz. wine, or 3 oz. 80 proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter-weight persons.	2-4 mm Hg

*For overall cardiovascular risk reduction, stop smoking
**The effects of implementing these modifications are dose- and time-dependent and could be greater for some individuals.

Weight Reduction and Maintenance

Hypertension is closely correlated with excess body weight. The prevalence of hypertension is 50% higher among overweight individuals, and 20 to 30% of hypertensive patients are overweight.

Research studies have documented the positive effects of weight reduction as a strategy for blood pressure control. Whenever indicated, weight reduction should be recommended either as an initial non-pharmacologic therapy or as an adjunct to pharmacologic therapy. The decrease in blood pressure is related to the amount of weight loss. However, even an initial loss of as little as 10 pounds can have a positive effect on blood pressure. Weight loss can also improve the efficacy of antihypertensive medications and the cardiovascular risk profile.

Initial weight loss and long-term weight control are both enhanced by a regular exercise program.

Patient education and/or nutritional counseling should be provided.

Moderation of Dietary Sodium

A relationship between dietary sodium intake and blood pressure has been demonstrated in multiple clinical and epidemiological studies. Modest sodium restriction may also reduce the amount of antihypertensive medications required.

However, individuals vary in response to a reduced sodium intake. Among hypertensives, African Americans, older patients, and patients with renal disease seem to be more sodium sensitive.

Moderation of Alcohol Intake

Several epidemiological studies have demonstrated an association between alcohol consumption and blood pressure. Alcohol affects both systolic and diastolic pressures, but its effects appear to be greater on systolic pressure. Significant elevations in blood pressure have been shown in individuals who consumed an average of at least three standard drinks per day compared with non-drinkers. Alcoholism may cause hypertension, and the alcoholic is less likely to respond to any hypertension treatment recommendations. Some persons may develop transitory hypertension during the first days of detoxification. Alcohol is also a concentrated calorie source which does not provide any nutrients. Reducing alcohol intake can help with weight reduction and may decrease triglyceride levels. The recommendation is to not exceed a daily alcohol intake of 1 ounce of ethanol.

Adequate Physical Activity

Epidemiological studies suggest that regular aerobic physical activity may be beneficial for both prevention and treatment of hypertension, enable weight loss, improve functional health status, and diminish all-cause mortality and risk of cardiovascular disease. 30 to 45 minutes of brisk walking most days of the week at target heart rate ([220-age] x 75% = target heart rate) is

adequate, inexpensive, and effective. Other aerobic activities (biking, swimming, jogging, etc.) may be more enjoyable. Resistive isotonic activities are not recommended to lower blood pressure in hypertensive patients when done as the only form of exercise training.

Potassium

There is no direct evidence that potassium supplementation lowers blood pressure chronically.

Tobacco Avoidance

Recent data using ambulatory blood pressure monitoring suggests that nicotine may indeed increase blood pressure and could account for some degree of blood pressure lability. In addition, it is a major risk factor for atherosclerotic cardiovascular disease. At each visit, establish tobacco use status and follow the NGC summary of the ICSI Tobacco Use Prevention and Cessation for Adults and Mature Adolescents guideline.

Relaxation and Stress Management

Although studies have not demonstrated a significant long-term effect of relaxation methods on blood pressure reduction, relaxation therapy may enhance an individual's quality of life and may have independent effects on lowering coronary heart disease risk.

Drug Therapy

A thiazide-type diuretic should be considered as initial therapy in most patients. Diuretics have been shown to be as good as or superior to other classes of drug therapy in preventing cardiovascular disease (CVD) morbidity and mortality and are inexpensive. Thiazide-type diuretics are especially useful for patients age 55 years or older with hypertension and additional risk factors for cardiovascular disease and for patients age 60 years or older with isolated systolic hypertension. In patients for whom diuretics are contraindicated or poorly tolerated, use of a beta-blocker, angiotensin-converting enzyme (ACE) inhibitor, angiotensin receptor blocker, or calcium antagonist is appropriate. Long-acting dihydropyridine calcium antagonists have been shown to be effective for patients age 60 years or older with isolated systolic hypertension. Co-existing medical conditions may also justify the use of one of these classes of drugs. An example is the use of an angiotensin-converting enzyme inhibitor in a patient with congestive heart failure or diabetic nephropathy. Please see the NGC summary of the ICSI guideline Management of Type II Diabetes Mellitus for further information. Other classes of drugs should be reserved for special situations or as additive therapy (see Annotation Appendix F, "Therapies," in the original guideline document.)

Many patients will require more than one drug for blood pressure control. Combination therapies that include a diuretic are often effective, lessen the risk for side effects (by use of low doses of each component drug), and

enhance adherence by simplification of the treatment program. For patients with chronic kidney disease three or more drugs may be needed to achieve goal.

Other considerations when selecting initial drug therapy include age, race, cost, drug interactions, side effects, and quality of life issues. In general diuretics and calcium channel blockers appear to be more effective as an initial treatment of hypertension in African Americans.

The lowest recommended dose of the chosen drug should be used initially. If tolerated, the dose can be increased or additional medications added to achieve goal blood pressure.

Because thiazide-type diuretics have been shown to be as good as or superior to other drug classes in preventing CVD morbidity and mortality, they should be considered preferred initial therapy in most patients. However, studies support the use of specific alternative drugs as initial therapy in the presence of specific co-existing diseases. ACE-inhibitors (ACEI) and angiotensin receptor blockers have been shown to be beneficial for patients with proteinuric renal disease (both diabetic and non-diabetic) by reducing proteinuria and slowing the rate of decline in renal function. ACEI have also been shown to provide symptomatic relief and prolong life for patients with heart failure (HF) and are the initial drug of choice for this condition. Beta-blockers reduce the risk of sudden death and recurrent myocardial infarction for patients with an initial myocardial infarction (MI). ACEI also reduce the risk of subsequent MI and progression to HF for patients who experience a large MI associated with impairment of left ventricular function. They also may reduce risk for patients with (or at high risk for) cardiovascular disease. Initial monotherapy with one of these agents is appropriate in these patient populations. A diuretic should be added if blood pressure response is not satisfactory.

Evidence from a recent large study refutes concerns about increased risk of myocardial infarction, cancer, or gastrointestinal bleeding from use of long-acting calcium antagonists. However, data does suggest that this class of drugs may be less effective in preventing HF. The guideline developers suggest these drugs be limited to those conditions listed in Annotation Appendix F, "Therapies," in the original guideline document. Data supporting potential dangers of calcium antagonists are limited to short-acting preparations (especially nifedipine) that are not approved for the treatment of hypertension.

Evidence from a recent large trial suggests that ACEI may be less effective in African Americans than thiazide-type diuretics in controlling blood pressure and in preventing stroke and cardiovascular disease.

Evidence supporting this recommendation is of classes: A, B, C, D, M, R

7. Blood Pressure (BP) at Goal?

Key Points:

- Systolic hypertension in patients aged 60 and older is an important modifiable cardiovascular risk factor.
- Accurate home monitoring systems are an important tool for assessing blood pressure control.
- Review drugs, over-the-counter medications, and herbal therapies that may interfere with BP goal.

Goal office blood pressures should be less than 140 mm Hg systolic and less than 90 mm Hg diastolic for all adults. Goal blood pressures measured out of the office setting should be less than 135 mm Hg systolic and less than 85 mm Hg diastolic.

For patients with a history of heart failure, goal office blood pressures are less than 130 mm Hg systolic and less than 80 mm Hg diastolic.

For patients with chronic kidney disease, goal office blood pressures are less than 130 mm Hg systolic and less than 80 mm Hg diastolic.

For patients with diabetes mellitus, goal office blood pressures are less than 130 mm Hg systolic and less than 80 mm Hg diastolic. Progressive reduction of systolic blood pressure to as low as 110 mm Hg has been shown to be associated with lower risk of microvascular and macrovascular complications.

For patients 60 years or older with isolated systolic hypertension who have markedly increased systolic blood pressure levels prior to treatment, it may not be possible to lower systolic blood pressure to less than 140 mm Hg. An interim goal of 160 mm Hg or what can be achieved by optimal doses of 3 antihypertensive drugs would be reasonable.

Systolic hypertension in patients age 60 and older is an important modifiable cardiovascular risk factor. [Conclusion Grade I: See Conclusion Grading Worksheet - Appendix A - Annotation #7 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for Stage 1 (systolic blood pressure [SBP] 140 to 159 mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade III: See Conclusion Grading Worksheet – Appendix A - Annotation #7 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for Stage 2 (SBP greater than or equal to 160 mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade I: See Conclusion Grading Worksheet - Appendix A - Annotation #7 (Isolated Systolic Hypertension) in the original guideline document]

Concerns have been raised that excessive lowering of diastolic blood pressure increases the risk of coronary events in patients with established coronary artery disease or left ventricular hypertrophy by lowering diastolic perfusion pressure in the coronary circulation. This is known as the J-curve hypothesis. Recent studies have also raised concerns about a J-curve relationship

between diastolic blood pressure level and risk for stroke in elderly patients treated for isolated systolic hypertension. No such J-shaped relationship has been observed between adverse event rates and systolic blood pressure level. Although not resolved, caution should be applied in lowering diastolic blood pressure below 75 mm Hg in patients with coronary artery disease or left ventricular hypertrophy or below 65 mm Hg in all elderly patients with isolated systolic hypertension. In the latter situation, this may require compromise of the goal level of systolic blood pressure achieved.

Evidence supporting this recommendation is of classes: A, B, M, R

8. Change Treatment

Once a hypertensive drug therapy is initiated, most patients should return for follow-up and medication adjustments at least at monthly intervals until BP goal is reached.

50% of patients with Stage 1 hypertension will be controlled with a single drug.

If blood pressure goals are not met, the clinician has three options for subsequent therapy:

- Increase the dose of the initial drug toward maximal levels.
- Substitute an agent from another class.
- Add a second drug from another class.

Individualized drug selection is based on several principles:

- If the initial response to one drug is adequate, continue the same drug.
- If the response is partial on one agent, increase the dose or add a second drug of a different class.
- If there is little response, substitute another single drug from a different class.
- Consider low-dose diuretic use early or as a first addition.
- Consider loop diuretic agents instead of thiazide or thiazide-like diuretics when creatinine is greater than 2.0 mg/dL or estimated GFR less than 30 mL/min per 1.73 m^2.
- Do not combine two drugs of the same class.
- The use of combination agents can be effective.

For many patients, two or more drugs in combination may be needed to reach hypertension goals. This is especially true for patients with hypertension goals focused on the low end or patients with chronic renal failure.

Evidence supporting this recommendation is of classes: A, R

9. BP at Goal?

Key Points:

- Carefully review potential barriers to long term adherence to therapy including the possible secondary diagnosis of depression.
- Systolic hypertension in patients aged 60 and older is an important modifiable cardiovascular risk factor.
- Accurate home monitoring systems are an important tool for assessing blood pressure control.
- Review drugs (prescription and over-the-counter) and herbal therapies that may interfere with BP goal.

If at this point acceptable response has not been achieved, several issues should be addressed or revisited. These include adherence to appropriate lifestyle modifications, consistent use of prescribed drugs, and tolerance of treatment modalities. Non-adherence rates to prescribed medications are estimated at 50% and are slightly higher for elderly and adolescent patients. Since there is not a simple test to accurately measure adherence, there are some practical methods that can be used for all patients: asking the patient about missed doses, watching treatment response, tracking missed appointments, tracking prescription refills, asking about issues of cost, and side effects. Although patients will generally overestimate their adherence, simply asking the question will help identify up to 50% of low-adherence patients. Standardized instruction in self-blood pressure measurement will allow assessment of "white coat" syndrome. Interfering substances which can adversely affect treatment include non-steroidal anti-inflammatory drugs, oral contraceptives, sympathomimetics, antidepressants, glucocorticoids, nasal decongestants, licorice-containing substances (e.g., chewing tobacco), cocaine, cyclosporine, and erythropoietin. Intermittent use of alcohol, particularly in alcoholics who are binge drinkers, may cause difficulties with widely fluctuating blood pressures.

Non-specific symptoms such as fatigue, lightheadedness, or vaguely impaired cognition may be due to an acute decline in blood pressure level and may resolve within four to six weeks while continuing the drug. Other minor drug-related symptoms unrelated to blood pressure change may also resolve in time without discontinuing the drug. Non-office standardized blood pressure measurement is desirable to monitor blood pressure control.

The factors that lead to non-adherence are multifactorial: misunderstanding of the treatment and the reason for it, adverse reactions (or fear of them), depression, complex dosing regimens, financial constraints, or simple forgetfulness. Asking open-ended/non-judgemental questions about treatment regimens can lead to a good discussion between the provider and patient about why the patient may have difficulty adhering. There are a number of recommendations that in various combinations may lead to better patient adherence. These suggestions are based on available evidence from randomized clinical trials that evaluated the usefulness of adherence interventions. To increase adherence on a long-term basis: provide education about the medication and how it fits with the treatment plan, simplify the regimen (e.g., less frequent dosing, combination medications, controlled release dosage forms), use patient adherence aids (e.g., pill boxes, alarms), offer support group sessions, send reminders for medication refills and appointments, cue medications to daily events (e.g., breakfast, bedtime), offer positive reinforcement (acknowledge the patient's efforts to adhere),

monitor with regular physician follow-up, and actively involve family members and significant others.

Evidence supporting this recommendation is of classes: M, R

10. Resistant Hypertension?

A patient has resistant hypertension when blood pressure goals are not met despite compliance with a triple drug regimen that includes a diuretic. Numerous reasons may exist for an inadequate or poor response to two, three, or more drugs, with volume overload due to excessive sodium intake or inadequate diuretic use being the more likely reasons. Other causes include nonadherence to therapy due to patient or health care provider issues, drug related causes (using a nonantihypertensive drug that can raise blood pressure), unrecognized secondary hypertension, pseudohypertension, or associated conditions including obesity and ethanol abuse.

The drug regimen should include a diuretic plus near maximal doses of two of the following classes of drugs:

- Beta-adrenergic-blocker or other anti-adrenergic agent
- Direct vasodilator
- Calcium channel-blocker
- ACE inhibitor
- Angiotensin receptor blocker

Several causes of resistant hypertension may be present:

- Improper BP measurement (over inflation of the cuff or using a cuff that is too small for the arm) can lead to inaccurately high readings.
- Brachial arteries may be heavily calcified or arteriosclerotic and cannot be fully compressed (pseudohypertension).
- Clinic or white coat hypertension
- Failure to receive adequate doses of medication (may be reluctance by patient or practitioner)
- Inadequate diuretic therapy
- Drug interactions

Evidence supporting this recommendation is of classes: A, D

11. Hypertension Consult

Consider hypertension consultation if a patient's blood pressure is not controlled on two medications or if secondary hypertension is suspected. All patients with blood pressure that is not controlled on three medications should be referred for consultation.

12. Hypertension Continuing Care

Key Points:

- On follow-up visits, history and physical examination should be directed toward detection of hypertensive target organ damage.
- In patients with office BP at goal who demonstrate progressive target organ disease, home monitoring may be beneficial.

Once blood pressure is at goal and stable, the patient should be seen usually at 3- to 6-month intervals by the provider to assess patient adherence, patient satisfaction, and any changes in target organ status. Patients with comorbidities such as heart failure, associated diseases such as diabetes, as well as the need for laboratory tests influence the frequency of visits. Lifestyle modifications should be reviewed, re-emphasized, and documented annually. Patients should monitor blood pressure more frequently by home monitoring or by other allied health professionals.

Ongoing care can be facilitated by physicians or specially trained allied health care professionals who provide education, reinforcement, realistic short- and long-term goal setting, and adjustment of medications according to the individual clinical situation. Intervention strategies that seek to involve the patient in decision-making can improve long-term adherence to therapy and thus better blood pressure control. Additionally, such an ongoing relationship might better identify those patients who are suitable candidates for a reduction or withdrawal of antihypertensive drug therapy following a prolonged interval of excellent blood pressure control.

On follow-up visits, history and physical examination should be directed toward detection of hypertensive target organ damage.

One may consider decreasing the dosage or number of anti-hypertensive drugs while maintaining lifestyle modification if:

- Patient has uncomplicated hypertension that is well controlled.
- Blood pressure has been maintained and documented for at least 1 year.

Evidence supporting this recommendation is of classes: M, R

Definitions:

Classes of Research Reports:

A. Primary Reports of New Data Collection:

Class A:

- Randomized, controlled trial

Class B:

- Cohort study

Class C:

- Non-randomized trial with concurrent or historical controls
- Case-control study
- Study of sensitivity and specificity of a diagnostic test
- Population-based descriptive study

Class D:

- Cross-sectional study
- Case series
- Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M:

- Meta-analysis
- Systematic review
- Decision analysis
- Cost-effectiveness analysis

Class R:

- Consensus statement
- Consensus report
- Narrative review

Class X:

- Medical opinion

Conclusion Grades:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results of different studies or because of serious doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results

from a limited number of studies of weak design for answering the question addressed.

Grade Not Assignable: There is no evidence available that directly supports or refutes the conclusion.

CLINICAL ALGORITHM(S)

A detailed and annotated clinical algorithm is provided for the Diagnosis and Treatment of Hypertension.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and classified for selected recommendations (see "Major Recommendations").

In addition, key conclusions contained in the Work Group's algorithm are supported by a grading worksheet that summarizes the important studies pertaining to the conclusion. The type and quality of the evidence supporting these key recommendations (i.e., choice among alternative therapeutic approaches) is graded for each study.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Adequate control of hypertension
- Prevention of end-organ damage due to hypertension
- Improved assessment of patients with hypertension
- Improved patient education about modifiable risk factors and the use of non-pharmacological treatments

POTENTIAL HARMS

Potential side effects and drug interactions associated with pharmacological management of hypertension are provided in Annotation Appendix F, "Therapies" of the original guideline document.

CONTRAINDICATIONS

CONTRAINDICATIONS

Contraindications to specific types of pharmacological management of hypertension are provided in Annotation Appendix F, "Therapies," in the original guideline document.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These clinical guidelines are designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and are not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. A guideline will rarely establish the only approach to a problem.
- This clinical guideline should not be construed as medical advice or medical opinion related to any specific facts or circumstances. Patients are urged to consult a health care professional regarding their own situation and any specific medical questions they may have.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Once a guideline is approved for general implementation, a medical group can choose to concentrate on the implementation of that guideline. When four or more groups choose the same guideline to implement and they wish to collaborate with others, they form a guideline action group.

In the action groups, each medical group sets specific goals they plan to achieve in improving patient care based on the particular guideline(s). Each medical group shares its experiences and supporting measurement results within the action group. This sharing facilitates a collaborative learning environment. Action group learnings are also documented and shared with interested medical groups within the collaborative.

Currently action groups may focus on one guideline or a set of guidelines such as hypertension, lipid treatment, and tobacco cessation.

Detailed measurement strategies are presented in the original guideline document to help close the gap between clinical practice and the guideline recommendations. Summaries of the measures are provided in the National Quality Measures Clearinghouse (NQMC).

IMPLEMENTATION TOOLS

Clinical Algorithm
Patient Resources
Pocket Guide/Reference Cards
Quality Measures
Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

RELATED NQMC MEASURES

- Hypertension diagnosis and treatment: percentage of patients who have blood pressure less than 140/90 mm Hg at the clinic visit.
- Hypertension diagnosis and treatment: percentage of patients presenting in clinic within the last month for whom patient education about modifiable risk factors has been documented in the medical record.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2005 Oct. 53 p. [97 references]

ADAPTATION

Parts of this guideline were adapted from The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 2003 May. 34 p.

DATE RELEASED

1995 Jun (revised 2005 Oct)

GUIDELINE DEVELOPER(S)

Institute for Clinical Systems Improvement - Private Nonprofit Organization

GUIDELINE DEVELOPER COMMENT

Organizations participating in the Institute for Clinical Systems Improvement (ICSI): Affiliated Organizations participating in the Institute for Clinical Systems Improvement (ICSI): Affiliated Community Medical Centers, Allina Medical Clinic, Altru Health System, Aspen Medical Group, Avera Health, CentraCare, Columbia Park Medical Group, Community-University Health Care Center, Dakota Clinic, ENT Specialty Care, Fairview Health Services, Family HealthServices Minnesota, Family

Practice Medical Center, Gateway Family Health Clinic, Gillette Children's Specialty Healthcare, Grand Itasca Clinic and Hospital, HealthEast Care System, HealthPartners Central Minnesota Clinics, HealthPartners Medical Group and Clinics, Hutchinson Area Health Care, Hutchinson Medical Center, Lakeview Clinic, Mayo Clinic, Mercy Hospital and Health Care Center, MeritCare, Mille Lacs Health System, Minnesota Gastroenterology, Montevideo Clinic, North Clinic, North Memorial Care System, North Suburban Family Physicians, Northwest Family Physicians, Olmsted Medical Center, Park Nicollet Health Services, Pilot City Health Center, Quello Clinic, Ridgeview Medical Center, River Falls Medical Clinic, Saint Mary's/Duluth Clinic Health System, St. Paul Heart Clinic, Sioux Valley Hospitals and Health System, Southside Community Health Services, Stillwater Medical Group, SuperiorHealth Medical Group, University of Minnesota Physicians, Winona Clinic, Ltd., Winona Health

ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; e-mail: icsi.info@icsi.org; Web site: www.icsi.org.

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GUIDELINE COMMITTEE

Cardiovascular Steering Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Work Group Members: Gary Schwartz, MD (Work Group Leader) (Mayo Clinic) (Hypertension); Vincent Canzanello, MD (Mayo Clinic) (Hypertension); Anthony Woolley, MD (Park Nicollet Health Services) (Internal Medicine/Hypertension); Troy Miller, DO (Sioux Valley Hospitals and Health System) (Family Practice); Patrick O'Connor, MD (HealthPartners Research Foundation) (Family Practice); Deborah Klein, PharmD (Allina Medical Clinic) (Pharmacy); Sylvia Robinson, BSN, MBA (ICSI) (Measurement Advisor); Brent Metfessel, MD, MPH (ICSI) (Evidence Analyst); Ann-Marie Evenson, BS, RHIT (ICSI) (Facilitator)

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

In the interest of full disclosure, ICSI has adopted a policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline topic. The reader should not assume that these financial interests will have an adverse impact on the content of the guideline. Readers of the guideline may assume that only work group members listed below have potential conflict of interest to disclose.

No work group members have potential conflicts of interest to disclose.

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GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2004 Feb. 47 p.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Institute for Clinical Systems Improvement (ICSI) Web site.

Print copies: Available from ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; Web site: www.icsi.org; e-mail: icsi.info@icsi.org.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Hypertension diagnosis and treatment. Executive summary. Bloomington (MN): Institute for Clinical Systems Improvement, 2005 Sep. 1 p. Electronic copies: Available from the Institute for Clinical Systems Improvement (ICSI) Web site
- 10 year CVD risk calculator (risk assessment). Annotation Appendix D in the original guideline document. Electronic copies: Available from the Institute for Clinical Systems Improvement (ICSI) Web site.
- ICSI pocket guidelines. May 2005 edition. Bloomington (MN): Institute for Clinical Systems Improvement, 2005. 362 p.

Print copies: Available from ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; Web site: www.icsi.org; e-mail: icsi.info@icsi.org.

PATIENT RESOURCES

The following is available:

- Health care guideline for patients and families: Diagnosing and treating hypertension (high blood pressure). Bloomington (MN): Institute for Clinical Systems Improvement, 2004 Oct.

Electronic copies: Available from the Institute for Clinical Systems Improvement (ICSI) Web site.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By

providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This summary was completed by ECRI on May 5, 1999. The information was verified by the guideline developer on July 6, 1999. This summary was updated by ECRI on April 19, 2001. The updated information was verified by the guideline developer as of June 28, 2001. This summary was updated again on June 18, 2002 and verified by the guideline developer on August 8, 2002. This summary was updated again by ECRI on January 28, 2004 and July 28, 2004, and December 15, 2005.

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